



[4910-13]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. FAA-2016-9403; Special Conditions No. 25-643-SC]

Special Conditions: Embraer, S.A., Model ERJ 190-300 Airplane; Dive-Speed Definition with High-Speed-Protection System

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions; request for comments.

SUMMARY: These special conditions are issued for the Embraer, S. A., (Embraer) Model ERJ 190-300 airplane. This airplane will have a novel or unusual design feature when compared to the state of technology envisioned in the airworthiness standards for transport-category airplanes. This design feature is a high-speed-protection system. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

DATES: This action is effective on Embraer on **[INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER]**. We must receive your comments by **[INSERT DATE 45 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: Send comments identified by docket number FAA-2016-9403 using any of the following methods:

- *Federal eRegulations Portal:* Go to <http://www.regulations.gov/> and follow the online instructions for sending your comments electronically.

- *Mail:* Send comments to Docket Operations, M-30, U.S. Department of Transportation (DOT), 1200 New Jersey Avenue, SE., Room W12-140, West Building Ground Floor, Washington, DC, 20590-0001.
- *Hand Delivery or Courier:* Take comments to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.
- *Fax:* Fax comments to Docket Operations at 202-493-2251.

Privacy: The FAA will post all comments it receives, without change, to <http://www.regulations.gov/>, including any personal information the commenter provides. Using the search function of the docket Web site, anyone can find and read the electronic form of all comments received into any FAA docket, including the name of the individual sending the comment (or signing the comment for an association, business, labor union, etc.). DOT's complete Privacy Act Statement can be found in the **Federal Register** published on April 11, 2000 (65 FR 19477-19478), as well as at <http://DocketsInfo.dot.gov/>.

Docket: Background documents or comments received may be read at <http://www.regulations.gov/> at any time. Follow the online instructions for accessing the docket or go to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: Greg Schneider, FAA, Airframe and Cabin Safety Branch, ANM-115, Transport Airplane Directorate, Aircraft Certification Service, 1601

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SUPPLEMENTARY INFORMATION:

The FAA has determined that notice of, and opportunity for prior public comment on, these special conditions is impracticable because these procedures could delay issuance of the design approval and thus delivery of the affected airplane.

In addition, the substance of these special conditions has been subject to the public-comment process in several prior instances with no substantive comments received. The FAA therefore finds that good cause exists for making these special conditions effective upon publication in the **Federal Register**.

The FAA is requesting comments to allow interested persons to submit views that may not have been submitted in response to the prior opportunities for comment described above.

Comments Invited

We invite interested people to take part in this rulemaking by sending written comments, data, or views. The most helpful comments reference a specific portion of the special conditions, explain the reason for any recommended change, and include supporting data.

We will consider all comments we receive by the closing date for comments. We may change these special conditions based on the comments we receive.

Background

On September 13, 2013, Embraer S.A. applied for an amendment to Type Certificate No. A57NM to include the new Model ERJ 190-300 series airplanes. The ERJ 190-300, which is a derivative of the ERJ 190-100 STD currently approved under Type Certificate No. A57NM, is a 97 to 114-passenger transport-category airplane designed with a new wing with a high aspect

ratio and raked wingtip, and a new electrical-distribution system. The maximum take-off weight is 124,340 lbs (56,400 kg).

Type Certification Basis

Under the provisions of § 21.101, Embraer must show that the ERJ 190-300 meets the applicable provisions of the regulations listed in Type Certificate No. A57NM, or the applicable regulations in effect on the date of application for the change, except for earlier amendments as agreed upon by the FAA.

If the Administrator finds that the applicable airworthiness regulations (i.e., 14 CFR part 25) do not contain adequate or appropriate safety standards for the Embraer Model ERJ 190-300 airplane because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same novel or unusual design feature, or should any other model already included on the same type certificate be modified to incorporate the same novel or unusual design feature, these special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the Embraer Model ERJ 190-300 airplane must comply with the fuel-vent and exhaust-emission requirements of 14 CFR part 34 and the noise-certification requirements of 14 CFR part 36.

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type certification basis under § 21.101.

Novel or Unusual Design Features

The Embraer Model ERJ 190-300 airplane will incorporate the following novel or unusual design feature: a high-speed-protection system.

Discussion

Section 25.335(b)(1) addresses a dive-speed condition, that was originally adopted in part 4b of the Civil Air Regulations, to provide an acceptable speed margin between design cruise speed and design dive speed. Design dive speed impacts flutter-clearance design speeds and airframe design loads. While the initial condition for the upset specified in the rule is 1 g level flight, protection is provided for other inadvertent overspeed conditions as well. Section 25.335(b)(1) is intended as a conservative enveloping condition for potential overspeed conditions, including non-symmetric conditions. To ensure that potential overspeed conditions are covered, the applicant should demonstrate that the airplane will not exceed dive speed in inadvertent, or gust-induced, upsets resulting in initiation of the dive from non-symmetric attitudes; or that the airplane is protected, by the flight-control laws, from getting into non-symmetric upset conditions. The applicant should conduct a demonstration that includes a comprehensive set of conditions, as described in the special conditions.

These special conditions are in lieu of § 25.335(b)(1). Section 25.335(b)(2), which also addresses the design dive speed, is applied separately. Advisory Circular (AC) 25.335-1A, Design Dive Speed, dated September 29, 2000, provides an acceptable means of compliance to § 25.335(b)(2)).

Special conditions are necessary to address the high-speed-protection system on the Embraer Model ERJ 190-300 airplane. The special conditions identify various symmetric and

non-symmetric maneuvers that will ensure that an appropriate design dive speed, V_D/M_D , is established.

These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

Applicability

As discussed above, these special conditions are applicable to the Embraer Model ERJ 190-300 airplane. Should Embraer apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design feature, these special conditions would apply to that model as well.

Conclusion

This action affects only certain novel or unusual design features on one model of airplane. It is not a rule of general applicability.

The substance of these special conditions has been subjected to the notice and comment period in several prior instances and has been derived without substantive change from those previously issued. It is unlikely that prior public comment would result in a significant change from the substance contained herein. Therefore, because a delay would significantly affect the certification of the airplane, the FAA has determined that prior public notice and comment are unnecessary and impracticable, and good cause exists for adopting these special conditions upon publication in the **Federal Register**. The FAA is requesting comments to allow interested persons to submit views that may not have been submitted in response to the prior opportunities for comment described above.

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

The Special Conditions

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis for Embraer Model ERJ 190-300 airplanes.

1. In lieu of compliance with § 25.335(b)(1), if the flight-control system includes functions that act automatically to initiate recovery before the end of the 20-second period specified in § 25.335(b)(1), V_D/M_D must be determined from the greater of the speeds resulting from special conditions 1(a) and 1(b), below. The speed increase occurring in these maneuvers may be calculated if reliable or conservative aerodynamic data are used.
 - a. From an initial condition of stabilized flight at V_C/M_C , the airplane is upset so as to take up a new flight path 7.5 degrees below the initial path. Control application, up to full authority, is made to try to maintain this new flight path. Twenty seconds after initiating the upset, manual recovery is made at a load factor of 1.5 g (0.5 g acceleration increment), or such greater load factor that is automatically applied by the system with the pilot's pitch control neutral. Power, as specified in § 25.175(b)(1)(iv), is assumed until recovery is initiated, at which time power reduction and the use of pilot-controlled drag devices may be used.
 - b. From a speed below V_C/M_C , with power to maintain stabilized level flight at this speed, the airplane is upset so as to accelerate through V_C/M_C at a flight path 15

degrees below the initial path (or at the steepest nose-down attitude that the system will permit with full control authority if less than 15 degrees). The pilot's controls may be in the neutral position after reaching V_C/M_C and before recovery is initiated. Recovery may be initiated three seconds after operation of the high-speed warning system by application of a load of 1.5 g (0.5 g acceleration increment), or such greater load factor that is automatically applied by the system with the pilot's pitch control neutral. Power may be reduced simultaneously. All other means of decelerating the airplane, the use of which is authorized up to the highest speed reached in the maneuver, may be used. The interval between successive pilot actions must not be less than one second.

2. The applicant must also demonstrate that the speed margin, established as above, will not be exceeded in inadvertent or gust-induced upsets resulting in initiation of the dive from non-symmetric attitudes, unless the airplane is protected, by the flight-control laws, from getting into non-symmetric upset conditions. The upset maneuvers described in Advisory Circular 25-7C, "Flight Test Guide for Certification of Transport Category Airplanes," section 8, paragraph 32, sub-paragraphs c(3)(a) and (b), may be used to comply with this requirement.
3. The probability of any failure of the high-speed-protection system that would result in an airspeed exceeding those determined by special conditions 1 and 2, above, must be less than 10^{-5} per flight hour.
4. Failures of the system must be annunciated to the pilots. Airplane flight-manual instructions must be provided that reduce the maximum operating speeds, V_{MO}/M_{MO} . With the system failed, the operating speed must be reduced to a value that maintains a

speed margin between V_{MO}/M_{MO} and V_D/M_D , and that is consistent with showing compliance with § 25.335(b) without the benefit of the high-speed-protection system.

5. Dispatch of the airplane with the high-speed-protection system inoperative could be allowed under an approved minimum equipment list that would require airplane flight-manual instructions to indicate reduced maximum operating speeds, as described in special condition 4, above. In addition, the flight-deck display of the reduced operating speeds, as well as the overspeed warning for exceeding those speeds, must be equivalent to that of the normal airplane with the high-speed-protection system operative. Also, the applicant must show that no additional hazards are introduced with the high-speed-protection system inoperative.

Issued in Renton, Washington, on February 7, 2017.

Michael Kaszycki
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Aircraft Certification Service
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